

CLAIMS

1. An apparatus comprising:
- a input port configured to receive a plurality of optical channels;
 - 5 an add/drop port configured to transmit a first drop channel of the plurality of channels when in a first channel mode and a second drop channel of the plurality of optical channels during a second channel mode; and
 - an output port configured to transmit the second drop channel during the first channel mode and the first drop channel during the second channel mode, the
 - 10 output port further configured to transmit the plurality of channels spectrally between the first channel and the second channel when in a channel tuning mode between the first channel mode and the second channel mode.
2. An apparatus in accordance with claim 1, wherein the output port is further
- 15 configured to transmit the plurality of optical channels during the channel tuning mode.
3. An apparatus in accordance with claim 1, wherein:
- the add/drop port is configured to receive a first alternate optical
 - 20 channel; and
 - the output port is further configured to transmit the first alternate optical channel during the first channel mode.
4. An apparatus in accordance with claim 3, wherein the first alternate optical
- 25 channel comprises a plurality of alternate optical channels.

5. An apparatus in accordance with claim 4, wherein the output port is further configured to transmit the first alternate optical channel within a first frequency bandwidth of the first drop channel.

5 6. An apparatus in accordance with claim 4, wherein:
the add/drop port is configured to receive a second alternate optical channel; and
the output port is further configured to transmit the second alternate optical channel during the second channel mode.

10 7. An apparatus in accordance with claim 6, wherein the output port is further configured to transmit the first alternate optical channel within a first frequency bandwidth of the first drop channel and configured to transmit the second alternate optical channel within a second frequency bandwidth of the second drop channel.

15 8. An apparatus in accordance with claim 7, wherein:
the first alternate optical channel has a bandwidth substantially equal to the first bandwidth and the second alternate optical channel has a bandwidth substantially equal to the second bandwidth.

20 9. An apparatus in accordance with claim 1, further comprising:
a first channel selector configured to direct the first drop channel to the add/drop port during the first channel mode; and
a second channel selector configured to direct the second drop channel
25 to the add/drop port during the second channel mode.

10. An apparatus in accordance with claim 9, wherein one or more of the channel selectors is fixed frequency channel selector.

11. An apparatus in accordance with claim 9, wherein one or more of the channel selectors is tunable frequency channel selector.

5 12. An apparatus in accordance with claim 9, wherein one or more of the channel selectors is a fixed bandwidth channel selector.

13. An apparatus in accordance with claim 9, wherein one or more of the channel selectors is a variable bandwidth channel selector.

10 14. An apparatus in accordance with claim 13, wherein one or more of the channel selectors is tunable frequency channel selector.

15 15. An apparatus in accordance with claim 6, further comprising:
a first switch configured to direct the plurality of optical channels from the input to the first channel selector during the first channel mode and to the second channel selector during the second channel mode; and
a second switch configured to direct a first plurality of resultant optical channels from an output of the first channel selector to the output port during the first
20 channel mode, and configured to direct a second plurality of resultant optical channels from an output of the second channel selector to the output port during the second channel mode.

25 16. An apparatus in accordance with claim 15, wherein one or more of the channel selectors is fixed frequency channel selector.

17. An apparatus in accordance with claim 15, wherein one or more of the channel selectors is tunable frequency channel selector.

18. An apparatus in accordance with claim 15, wherein one or more of the channel selectors is a fixed bandwidth channel selector.

5 19. An apparatus in accordance with claim 15, wherein one or more of the channel selectors is a variable bandwidth channel selector.

20. An apparatus in accordance with claim 19, wherein one or more of the channel selectors is tunable frequency channel selector.

10 21. An apparatus in accordance with claim 6, further comprising:
a switch configured to direct the plurality of optical channels from the input to the first channel selector during the first channel mode and to the second channel selector during the second channel mode; and
15 a optical channel coupler configured to direct a first plurality of resultant optical channels from an output of the first channel selector to the output port and configured to direct a second plurality of resultant optical channels from an output of the second channel selector to the output port.

20 22. An apparatus in accordance with claim 2, further comprising:
a switch optically coupled between the input port and the output port, the switch configured to direct the plurality of optical channels from the input port to the output port during the channel tuning mode; and
a channel selector optically coupled to the switch and configured to
25 direct the first drop channel to the add/drop port in a first channel mode.

23. An apparatus in accordance with claim 22, wherein the channel selector is further configured to direct the alternate optical channel to the switch in the first channel mode.

5 24. An apparatus in accordance with claim 23, wherein the channel selector is further configured to direct the second optical channel of the plurality of optical channels to the switch in a second channel mode.

10 25. An apparatus in accordance with claim 24, wherein the second optical channel comprises a plurality of second optical channels.

15 26. An apparatus in accordance with claim 24 wherein the channel selector is further configured to change from the first channel mode to the second channel mode during the channel tuning mode by shifting from the first frequency bandwidth of the first channel to a second frequency bandwidth of the second channel.

27. An apparatus in accordance with claim 26, wherein one or more of the channel selectors is fixed frequency channel selector.

20 28. An apparatus in accordance with claim 26, wherein one or more of the channel selectors is tunable frequency channel selector.

29. An apparatus in accordance with claim 26, wherein one or more of the channel selectors is a fixed bandwidth channel selector.

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30. An apparatus in accordance with claim 26, wherein one or more of the channel selectors is a variable bandwidth channel selector.

31. An apparatus in accordance with claim 30, wherein one or more of the channel selectors is tunable frequency channel selector.

5 32. An apparatus in accordance with claim 1, wherein the add/drop port comprises:
an add port configured to receive the alternate optical channel and any number of additional alternate optical channels; and
a drop port configured to transmit the one or more of the plurality of optical channels.

10 33. An apparatus in accordance with claim 1, wherein the first channel is a plurality of first channels.

15 34. An apparatus in accordance with claim 1, wherein the second channel is a plurality of second channels.

35. A method comprising:
receiving, at an input port, a plurality of optical channels comprising a first drop channel and a second drop channel;
20 directing the first drop channel to an add/drop port during a first drop channel mode;
directing the second drop channel to the add/drop port during a second channel mode; and
directing one or more optical channels of the plurality of optical channels spectrally
25 located between the first drop channel and the second drop channel to an output port while changing from the first channel mode to the second channel mode.

36. A method in accordance with claim 35, wherein the directing the one or more optical channels spectrally located between the first drop channel and the second drop channel comprises directing the plurality of optical channels to the output port.

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37. A method in accordance with claim 35, further comprising:
directing the second drop channel to the output port during the first channel mode; and
directing the first drop channel to the output port during the second
10 channel mode.

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